Reports

Mammoth-Bone Shaft Wrench from Murray Springs, Arizona

Abstract. *Archeological excavations at Murray Springs, Cochise County, Arizona, in July 1967 uncovered a unique bone tool in the Clovis occupation level and in association with bones of a mammoth. The tool may be a wrench for straightening shafts of spears; if so, shaft diameters ranging from 14 to 17 millimeters were most likely used in hafting Clovis projectile points.*

During geological reconnaissance of San Pedro Valley, southeastern Arizona, an outcrop of mammoth bones was discovered (*1*) near Murray Springs in Cochise County. The stratigraphic context of the bones was very similar to that at the famous Lehner Clovis site 19 km to the south (*2*), so that there was speculation that Murray Springs might be another site like Lehner where Clovis hunters killed and butchered mammoths.

Excavations in 1966 revealed a partial skeleton of a mammoth, as well as scattered remains of Pleistocene forms of bison, horse, camel, and wolf. Several flint flakes near the mammoth bones clearly indicated Early Man's presence and prompted more extensive excavation. This year a nearly complete skeleton of a mammoth was found on a buried occupation surface upon which more than 3000 flint flakes were found along with seven flint tools, including Clovis points, and one bone tool; all were scattered about the mammoth (*3*).

This report is concerned with the bone tool (see cover); we describe it so that it may be compared with similar objects found elsewhere in the world, hoping to learn of other objects resembling it.

The unusual bone tool is 259 mm long, 21 mm thick, and shaped like an eyebolt. The head, 58 mm wide, has a 25- to 30-mm hole bored through the center. The handle is 34 mm wide where it joins the head and gradually tapers to an approximate width of 21 mm at the opposite end. The wall of the hole has been purposely beveled, the most pronounced beveling occurring at the top and bottom of the hole on both sides (Fig. 1); the edges of the beveled surfaces are relatively sharp and show no obvious evidence of rounding by wear in use.

The beveled surfaces on opposite sides of the bottom of the hole are the most pronounced of all; they converge at 79 degrees to a rounded edge. In longitudinal section these surfaces make angles of 35 and 44 degrees with respect to the axis of the tool.

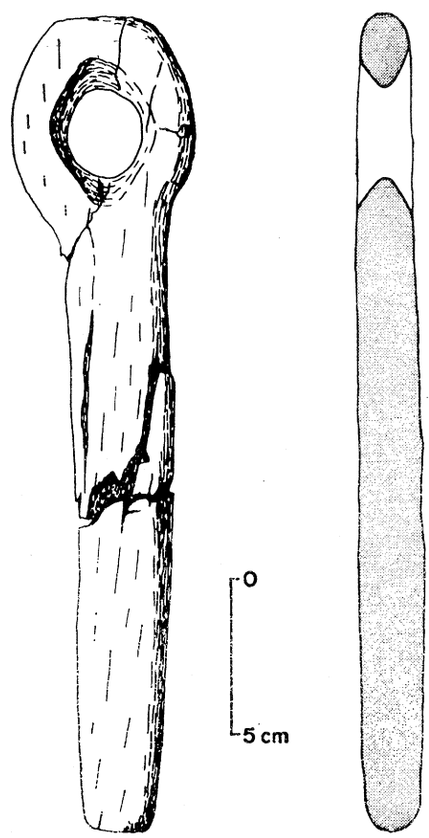

Fig. 1. Plan view and longitudinal cross section of the Clovis bone tool.

In size and texture the bone compares more closely to material from the walls of mammoth long bones than from similar parts of horse, camel, or bison, which are the only other likely sources of late-Wisconsin age of such large fragments of bone. Mammoth bone is not a surprising source because mammoths were apparently the common prey of the Clovis hunters.

The tool was found in two joined but broken parts lying horizontally on the buried surface of an ancient stream bank, approximately 2 m from the edge of a channel deposit aged 11,230 ± 340 years (A-805) (*4*) and 10 m southeast of the mammoth. The tool was thus between the carcass and the ancient stream; the area, once muddy, bore many depressions thought to be mammoth tracks, none of which was directly superimposed on the tool. The distal part was tilted downward from the break, so that this part lay slightly below the stratigraphic contact that was the occupation surface; the rest of the tool was partly in an underlying sandy clay and partly in an overlying organic silt. The fracture pattern of the break, through the handle, is jagged and stepped in a manner similar to that described for fresh bone (*5*). We cannot now say whether the break at midshaft resulted from force applied inadvertently, the tread of an animal, or man's use of the tool.

The manner of use of the tool may always remain a matter of speculation. Its similarity to the *bâton de commandement* known from the European Upper Paleolithic is obvious, but even the use of such antler tools is speculative (*6*). The Murray Springs tool is not believed to have been used as a thong stropper (*7*), rope twister, or tether because significant wear from such use would have left rounded edges around the hole; and such uses would not account for the positioning of the more pronounced beveling at the top and bottom of the hole. On the other hand, the form of the tool appears to be well suited for the straightening of wood or bone used for the shafts of spears; similar tools were used by Eskimos for straightening bone shafts (*8*).

The size of the hole and the angles of the steeper bevels limit the size of shafts that could be conveniently straightened by such use of the tool. Cylindrical shafts ranging in diameter from 13 to 18 mm, in 1-mm incre-

ments, were tried in the "eye" of the tool. The best fit of a cylindrical shaft to the tool, as determined by the contact of the shaft with the interior surfaces of the beveled hole, is by a 15-mm-diameter shaft. Such a shaft makes an angle of 40 degrees with the long axis of the tool, regardless of which side of the hole it is inserted through, and the shaft surface snugly fits the beveled surfaces at the top and bottom of the hole. An 18-mm-diameter shaft does not quite fit the rounded trough-like bevels, and makes an angle of about 44 degrees with the long axis of the tool, whereas a shaft as small as 13 mm in diameter is decidedly a misfit, even though it could be easily bent by the tool.

These experiments suggest that as a shaft wrench the tool would be most effective on shafts between 14 and 17 mm in diameter, which are comparable with what one would expect to have been used for hafting the 25 Clovis points now known from San Pedro Valley. The lightness of shafts of these diameters suggests that they may have been used as foreshafts for spears or darts.

To the best of our knowledge this possible Clovis shaft wrench is unique in New World archeology; we would appreciate information regarding similar finds in either the New World or the Old.

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References and Notes

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9. Radiocarbon dating and geological investigations supported by NSF grant GP-5548; archeological investigations, by the National Geographic Society and the Arizona State Museum. We thank E. W. Haury, R. H. Thompson, and T. Smiley for constructive criticism of the manuscript. Contribution 151 of the University of Arizona Program in Geochronology.

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Glaciation in Taylor Valley, Antarctica, Older Than 2.7 Million Years

Abstract. *Potassium-argon dates for three samples of basaltic scoria from Taylor Valley, on the west side of McMurdo Sound, indicate that the basalt, which antedates and postdates major glaciations, is at least 2.7 million years old.*

The extensive ice-free areas in the Transantarctic Mountains, fringing the west coast of McMurdo Sound, are among the largest in Antarctica. Drift left by ancient glaciers is widespread, and thus the region offers an outstanding opportunity for study of the glacial history of the continent. Taylor Valley extends for about 85 km through the mountains, from the Antarctic Ice Sheet on the west to McMurdo Sound on the east. The western 50 km of the valley are occupied by Taylor Glacier, an outlet of the ice sheet; the eastern 35 km are now free of ice except for small alpine glaciers on the valley walls (Fig. 1). The floor of the eastern part of the valley ranges in altitude from sea level to about 100 m, and the flanking peaks attain altitudes exceeding 2000 m.

Taylor Valley has been extensively modified by ice during past glaciations. The cross profile is characterized by a

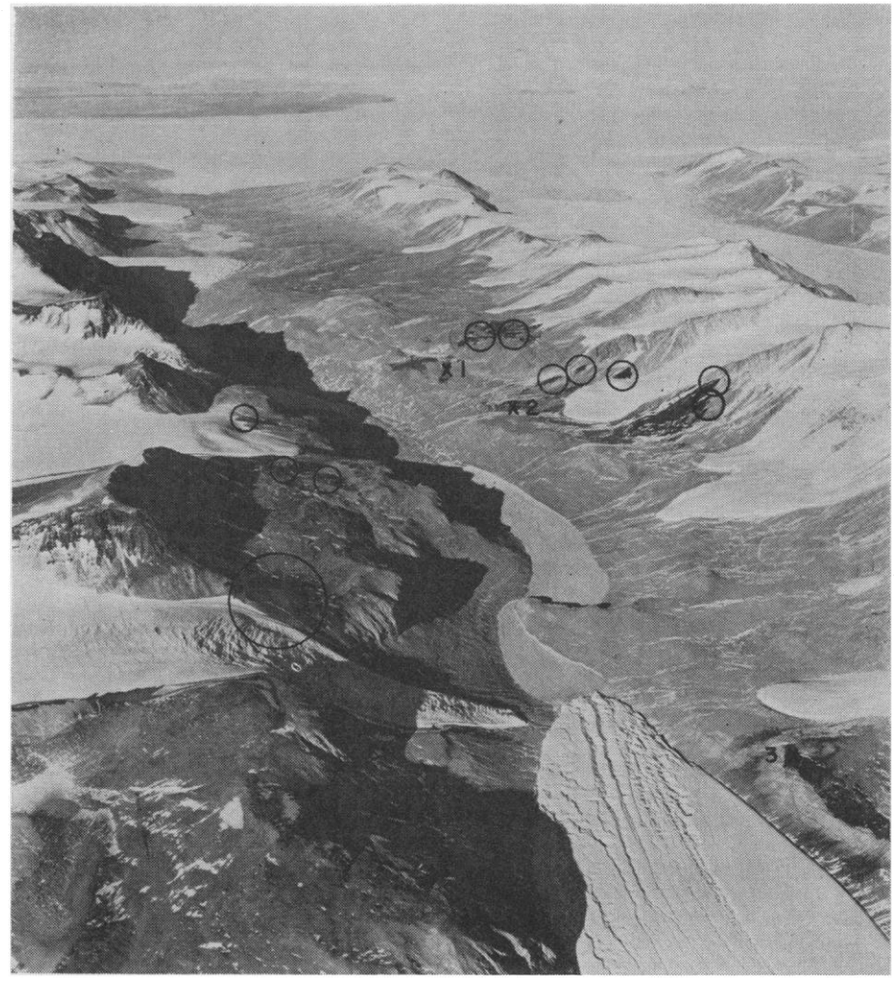

Fig. 1. Taylor Valley, eastward to McMurdo Sound; sources of the dated basalts are indicated on the upper benches and walls. Circles mark basalts at known and possible vent areas; nearby dark accumulations of basalt are talus, till, gelifluction deposits. The *x*'s mark sources of dated samples (Table 1). The dark strip of basalt debris near Taylor Glacier (lower right) is a moraine derived mainly from volcanic sources, further up the valley, on the valley wall. The flanking mountains stand as high as 2000 m above ice-covered Lake Bonney (center). [U.S. Navy, for U.S. Geological Survey, 7 November 1959]